

ABSTRACT

The method for the fabrication of nano scale temperature sensors and nano scale heaters using focused ion beam (FIB) techniques. The process used to deposit metal nano strips to form a sensor is ion beam assisted chemical vapor deposition (CVD). The FIB Ga^+ ion beam can be used to decompose $\text{W}(\text{CO})_6$ molecules to deposit a tungsten nano-strip on a suitable substrate. The same substrate can also be used for Pt nano-strip deposition. The precursors for the Pt can be trimethyl platinum $(\text{CH}_3)_3\text{Pt}$ in the present case. Because of the Ga^+ beam used in the deposition, both Pt and W nano-strips can contain a certain percentage of Ga impurities, which we denoted as Pt(Ga) and W(Ga) respectively. Our characterization of the response of this Pt(Ga)/W(Ga) nano scale junction indicates it has a temperature coefficient of approximately $5.4 \text{ mV}/^\circ\text{C}$. This is a factor of approximately 130 larger than the conventional K-type thermocouples.

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